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(21)Application number : 07-285571 (71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

(22)Date of filing : 02.11.1995 (72)Inventor : MURAMATSU AKIHIRO
INOUE KENGO

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(54) LIQUID CRYSTAL VIEW FINDER

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a small-sized device which prevents thermal destruction of a liquid crystal panel due to reverse incident light without an effect upon the brightness of picture light of the view finder.
SOLUTION: A polarizing plate 6 whose transmission oscillation direction is parallel with the oscillation direction of light emitted from a liquid crystal panel 1 is arranged in a position where reverse incident light made incident from the aperture part of a liquid crystal view finder is not focused by a magnifying lens 5, thereby preventing thermal destruction of a polarizing plate 4 on the surface of the liquid crystal panel due to reverse incident light while keeping the brightness of picture light.

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CLAIMS

[Claim(s)]
[Claim 1] Liquid crystal viewfinder equipment characterized by preventing the thermal runaway of the liquid crystal panel surface polarizing plate by the reverse incident light which arranges the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the image light injected from a liquid crystal panel ahead of said liquid crystal panel, and carries out ON light from opening of a liquid crystal viewfinder.
[Claim 2] Liquid-crystal viewfinder equipment characterized by to have arranged the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the light injected from said liquid crystal panel in the location to which the

focus of the reverse incident light which carries out ON light from opening of said liquid crystal viewfinder with said magnifying lens is not connected in the liquid crystal viewfinder equipment constituted so that the image injected by one or more magnifying lenses from a liquid crystal panel could be ******(ed).

[Claim 3] Liquid crystal viewfinder equipment according to claim 2 constituted so that the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the light injected from said liquid crystal panel while constituting a magnifying lens movable to said liquid crystal panel might be moved with said magnifying lens.

[Claim 4] Liquid crystal viewfinder equipment according to claim 2 characterized by having arranged the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the light injected from a liquid crystal panel the entry side of said reverse incident light, or in the magnifying lens system constituted by two or more magnifying lenses.

[Claim 5] Liquid crystal viewfinder equipment according to claim 2 characterized by pasting up the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the light injected from a liquid crystal panel on the surface of a magnifying lens.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention has the description about the liquid crystal viewfinder equipment used for a video camera etc. for the thermal runaway prevention means of a liquid crystal panel surface polarizing plate.

[0002]

[Description of the Prior Art] In recent years, as for the liquid crystal panel used for liquid crystal viewfinder equipment, the miniaturization is advanced for the miniaturization of equipment, or reduction of a price. since what has an apparent large field of view is liked on the other hand -- the scale factor of a magnifying lens -- more -- high -- a scale factor thing is needed. Moreover, since that by which an image display screen is not greatly kicked from a field of view is liked even if a photography

person separates a face from a finder, what has the bigger diameter of opening of a magnifying lens is needed.

[0003] It explains referring to drawing 7 and drawing 8 about conventional liquid crystal viewfinder equipment below. Drawing 7 shows the configuration of conventional liquid crystal viewfinder equipment. Drawing 7 , the polarizing plate which pasted up 1 on the liquid crystal panel and pasted up 2 on the front face by the side of the source of the illumination light of a liquid crystal panel 1 in drawing 8 (it considers as the source side polarizing plate of the illumination light below), As for the liquid crystal layer (it considers as a liquid crystal layer below) by which 3 was inserted into the glass plate of a liquid crystal panel 1, the polarizing plate (it considers as a panel surface polarizing plate below) which pasted up 4 on the front face by the side of the magnifying lens of a liquid crystal panel 1, and 5, a magnifying lens and 7 are the sources of the illumination light of a liquid crystal panel 1.

[0004] The source side polarizing plate 2 of the illumination light which chooses the oscillating direction of the illumination light which carries out incidence to the liquid crystal layer 3 when a liquid crystal panel 1 absorbs the light of the specific oscillating direction, It consists of panel surface polarizing plates 4 which absorb the light of the specific oscillating direction injected from the liquid crystal layer 3 which rotates the oscillating direction of light partially, and the liquid crystal layer 3, and it is illuminated by the light injected from the source equipment 7 of the illumination light, it is controlled [it is controlled by the electrical circuit, and] by the electrical circuit, and an image is displayed.

[0005] The image displayed on the liquid crystal panel 1 is expanded by the magnifying lens 5. Although diopter accommodation is performed by moving a liquid crystal panel 1 and a magnifying lens 5, though natural when light carries out reverse incidence to liquid crystal viewfinder equipment with such a configuration, it is condensed with a magnifying lens 5 and the reverse incident light connects a focus near the liquid crystal panel 1.

[0006] For example, if opening of a finder is accidentally turned in the direction of solar, reverse incidence will be carried out, it will be condensed by the magnifying lens 5, and a solar intense light will connect a focus near the liquid crystal panel 1. That is, solar intense light will gather for the minute area on a liquid crystal panel 1. There are the panel surface polarizing plate 4, a color filter (not shown), a grid-like gobo (not shown), etc. in a liquid crystal panel 1, and a local temperature rise will be caused.

[0007] Since the panel surface polarizing plate 4 is using resin as the substrate, if a thermal runaway cuts by the temperature rise, a polarization property is lost and it will stop returning especially. For this reason, the technique of using for a finder the ingredient which causes concentration change by the strength of light (for example, JP,57-136615,A), using the filter which does not penetrate the light of an infrared region (for example, JP,2-60165,B), or using the device which detects reverse

incident light and closes a shutter (for example, JP,3-14163,B) is proposed.

[0008]

[Problem(s) to be Solved by the Invention] Since the thing using the ingredient which causes concentration change by the strength of light in the above conventional liquid crystal viewfinder equipments absorbed lifting reverse incident light for concentration change when reverse incident light became strong, it was effective in suppressing generation of heat of the panel surface polarizing plate 4 by reverse incident light, but the image was dark when reverse incident light became strong, since it absorbed similarly about the image light injected from a liquid crystal panel.

[0009] Moreover, although, as for the thing using the filter which does not penetrate the light of a near-infrared region, the light of an infrared region did not reach the panel surface polarizing plate 4 among reverse incident light, since the panel surface polarizing plate 4 had the property which hardly absorbs the light of an infrared region, there was little effectiveness of suppressing generation of heat of the panel surface polarizing plate 4.

[0010] Moreover, if equipment becomes expensive, and a face is separated from a finder when reverse incident light is strong, the image currently displayed on the finder will be kicked, and the thing using the device which detects reverse incident light and closes a shutter was not able to observe this image. The purpose of this invention solves the conventional technical problem, and is to offer the liquid crystal viewfinder equipment using a small liquid crystal panel.

[0011]

[Means for Solving the Problem] In order to attain this purpose, the liquid crystal viewfinder equipment of this invention is characterized by having arranged the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the light injected from said liquid crystal panel in the location to which the focus of reverse incident light is not connected by said magnifying lens in the liquid crystal viewfinder equipment constituted so that the image injected from a liquid crystal panel might be ******(ed) by one or more magnifying lenses.

[0012] While the thermal runaway of a panel surface polarizing plate is suppressed from opening of said viewfinder to the reverse incident light which carries out ON light by arranging the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the image light injected from a liquid crystal panel between a liquid crystal panel and viewfinder opening according to this invention, the liquid crystal viewfinder equipment which does not affect the image light injected from a liquid crystal panel, either can be offered.

[0013]

[Embodiment of the Invention] Invention of this invention according to claim 1 by arranging the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the image light injected from a liquid crystal panel It is

characterized by preventing the thermal runaway of the liquid crystal panel surface polarizing plate by the reverse incident light which carries out ON light from opening of a liquid crystal viewfinder, without affecting the brightness of said image light. Since said reverse incident light is absorbed by arranging said polarizing plate in the location to which the focus of said reverse incident light is not connected, in this liquid crystal panel surface polarizing plate top pasted up on the surface of the liquid crystal panel, the temperature rise by said reverse incident light is suppressed, and a thermal runaway does not start.

[0014] On the other hand, in order for the image light injected from a liquid crystal panel to serve as the transparency oscillating direction of said polarizing plate newly constituted since it was the light which penetrated the liquid crystal panel surface polarizing plate adhered to the front face of said liquid crystal panel, and the parallel oscillating direction and to penetrate as it is, it has an operation of not affecting the brightness of an image with said newly constituted polarizing plate.

[0015] In the liquid crystal viewfinder equipment constituted so that invention according to claim 2 could ****** the image injected by one or more magnifying lenses from a liquid crystal panel In the location to which the focus of the reverse incident light which carries out ON light from opening of said liquid crystal viewfinder with said magnifying lens is not connected, the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the light injected from said liquid crystal panel by arranging Since said reverse incident light is absorbed, in this liquid crystal panel surface polarizing plate top pasted up on the surface of the liquid crystal panel, the temperature rise by said reverse incident light is suppressed, and a thermal runaway does not start. In order for the image light injected from a liquid crystal panel to, serve as the transparency oscillating direction of said polarizing plate newly constituted since it was the light which penetrated the liquid crystal panel surface polarizing plate adhered to the front face of said liquid crystal panel, and the parallel oscillating direction on the other hand and to penetrate as it is, the brightness of an image has an operation of not changing, with said newly constituted polarizing plate.

[0016] While invention according to claim 3 constitutes a magnifying lens movable to said liquid crystal panel By constituting so that the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the light injected from said liquid crystal panel may be moved with said magnifying lens Even if you make it move for diopter adjustment of said magnifying lens, the focus of the reverse incident light which penetrated said magnifying lens approaches on the newly constituted polarizing plate, and it has an operation that the distributed degree of generation of heat does not worsen.

[0017] Invention according to claim 4 by constituting the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the light

injected from a liquid crystal panel in the magnifying lens system constituted by two or more magnifying lenses near the entry of said reverse incident light While the amount of light reflected with a magnifying lens is made in half [conventional] and being able to suppress the fall of the contrast of the image by reflection of said reverse incident light, when a property deteriorates by long-term use of said polarizing plate, it has the operation which can exchange said polarizing plate easily.

[0018] Invention according to claim 5 has the operation which that also of the need for components of holding said polarizing plate is lost, and can be miniaturized while the fall of the contrast of the image by reflection is suppressed, since the number of reflectors does not increase by constituting the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the light injected from a liquid crystal panel on the surface of a magnifying lens by adhesion.

[0019] It explains referring to the drawing of drawing 6 from drawing 1 about the gestalt of operation of this invention below. In the example of this invention, the same sign is attached about the same part as the component explaining the above-mentioned conventional example, and explanation is omitted. The liquid crystal layer 3 which a liquid crystal panel 1 is controlled [layer] by the electrical circuit (not shown), and rotates the oscillating direction of light partially in drawing 1 and drawing 2 , The source side polarizing plate 2 of the illumination light which chooses the transparency oscillating direction of the illumination light which carries out incidence to this liquid crystal layer 3, It consists of panel surface polarizing plates 4 which absorb the light of the specific oscillating direction injected from said liquid crystal layer 3, is illuminated by the light injected from the source equipment 7 of the illumination light, it is controlled by said electrical circuit, and an image is displayed. Moreover, 6 is the polarizing plate (it abbreviates to a preceding paragraph polarizing plate below) of the transparency oscillating direction parallel to the oscillating direction of the light injected from said liquid crystal panel 1.

[0020] By the way, the source side polarizing plate 2 of said illumination light, the panel surface polarizing plate 4, and the preceding paragraph polarizing plate 6 are polarizing plates which use a high polymer film as a substrate, if light (all the oscillating directions are included uniformly) carries out incidence to this polarizing plate, the light of the specific oscillating direction component will be absorbed and will generate heat, and the light of this oscillating direction component and the light of the oscillating direction component which goes direct have the property penetrated as it is. Therefore, since the image light injected from a liquid crystal panel 1 is the light of the transparency oscillating direction of the panel surface polarizing plate 4, only light which vibrates in the specific direction will be consisted of, and said image light penetrates the preceding paragraph polarizing plate 6 as it is, and it is expanded by the magnifying lens 5 and it projects it.

[0021] When outdoor daylight carries out reverse incidence to the finder equipment of

the above-mentioned configuration, however, the light of the oscillating direction absorbed with the preceding paragraph polarizing plate 6 It is the light of the oscillating direction constituting the cause of generation of heat of the above-mentioned panel surface polarizing plate 4, and since the light which passed the preceding paragraph polarizing plate 6 is the light which vibrates in the transparency oscillating direction of the panel surface polarizing plate 4, it passes the panel surface surface polarizing plate 4 as it is, and generation of heat by absorption is lost. In the preceding paragraph polarizing plate 6, although generation of heat by absorption occurs, if you make it the preceding paragraph polarizing plate 6 located in the location to which the focus of reverse incident light is not connected by said magnifying lens 5, only few temperature rises will happen.

[0022] On the other hand, since the image light from a liquid crystal panel 1 is the light which penetrated said panel surface polarizing plate 4, only the light of the oscillating direction of an one direction exists as everyone knows and the preceding paragraph polarizing plate 6 is configurated so that the light of the oscillating direction may be penetrated, it penetrates as it is, and said image becomes dark, eye backlash formed the preceding paragraph polarizing plate 6 projects it, and it is not hard coming to see said image light.

[0023] Next, the case where a magnifying lens 5 must be moved is explained for diopter accommodation. When a magnifying lens 5 is made to have to move leftward and diopter adjustment must be carried out in drawing 3 when diopter accommodation must be adjusted to a negative side namely Although the problem that the focus of said reverse incident light is not connected on the preceding paragraph polarizing plate 6, and generation of heat occurs by reverse incident light on the preceding paragraph deflecting plate 6 is not generated When diopter accommodation must be adjusted to a forward side on the contrary, the focal location of a magnifying lens 5 separates near the liquid crystal panel 1, and moves onto the preceding paragraph polarizing plate 6 gradually, and it comes to connect a focus on the preceding paragraph polarizing plate 6 soon.

[0024] Then, even if it carries out the maximum accommodation migration of the magnifying lens 5 at a forward side, if the preceding paragraph polarizing plate 6 is arranged in the location where the focus of this magnifying lens 5 is not connected on the preceding paragraph polarizing plate 6, the focus of said reverse incident light will not be connected and generation of heat will be distributed by it. Then, when it adjusts in the forward direction as mentioned above for diopter adjustment of a magnifying lens 5, the preceding paragraph polarizing plate 6 approaches the focus of the reverse incident light of this magnifying lens 5, and drawing 4 is constituted so that the distributed degree of generation of heat may not worsen, and the preceding paragraph polarizing plate 6 may be made to move united with a magnifying lens 5.

[0025] When the magnifying lens 8 is the magnifying lens 5 for diopter adjustment, and

really constituted between the preceding paragraph polarizing plate 6 of a configuration, and the liquid crystal panel 1, since the amount of light reflected with this magnifying lens 8 since only the light of the specific oscillating direction reaches among reverse incident light is made in half [conventional] by the example of drawing 5 , it can suppress the fall of the contrast of the image by reflection of reverse incident light to this magnifying lens 8.

[0026] Moreover, when the arrangement configuration of the preceding paragraph polarizing plate 6 is carried out at the right-hand side, i.e., entry of reverse incident light, side of a magnifying lens 5 and a property deteriorates by use of a long period of time [polarizing plate / 6 / preceding paragraph], it can exchange easily. Moreover, by making the front face of a magnifying lens 5 into the concave surface or convex near a flat surface or a flat surface, as shown in drawing 6 , the preceding paragraph polarizing plate 6 can be pasted up on the front face. Since the number of reflectors does not increase by adding the preceding paragraph polarizing plate 6 by this, while the fall of the contrast of the image by reflection is suppressed, the need for components of holding the preceding paragraph polarizing plate 6 is also lost, and a miniaturization is possible. In addition, although the example explained the polarizing plate of an absorption mold about the preceding paragraph polarizing plate 6, effectiveness with the same said of the polarizing plate of a prism mold is acquired.

[0027]

[Effect of the Invention] As mentioned above, since generation of heat of the liquid crystal panel generated by reverse incident light can be suppressed without changing the brightness of an image by carrying out the arrangement configuration of the polarizing plate of the transparency oscillating direction parallel to the oscillating direction of the light injected from a liquid crystal panel according to the liquid crystal viewfinder equipment of this invention, the liquid crystal viewfinder which a thermal runaway does not generate by said reverse incident light even if it turns opening of a viewfinder in the direction of solar accidentally is realizable.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The sectional view of the liquid crystal viewfinder equipment in the 1st example of this invention

[Drawing 2] The decomposition perspective view of this example

[Drawing 3] The sectional view showing the migration condition of the magnifying lens in this example

[Drawing 4] The sectional view of the liquid crystal viewfinder equipment in the 2nd example of this invention

[Drawing 5] The sectional view of the liquid crystal viewfinder equipment in the 3rd example of this invention

[Drawing 6] The sectional view of the liquid crystal viewfinder equipment in the 4th example of this invention

[Drawing 7] The sectional view of conventional liquid crystal viewfinder equipment

[Drawing 8] Isomerism solution perspective view

[Description of Notations]

1 Liquid Crystal Panel

2 Source Side Polarizing Plate of Illumination Light

3 Liquid Crystal Layer

4 Panel Surface Polarizing Plate

5 Magnifying Lens

6 Preceding Paragraph Polarizing Plate

7 Source Equipment of Illumination Light

8 Magnifying Lens